Enterprise Commonality

Informational Brief

20 April 2010

Introduction

- ***Since Q1 2008, NAVSEA has piloted, developed and accelerated a Commonality program***
- ***The Commonality program is designed to reduce TOC through both acquisition and lifecycle savings***
- ***Each Commonality Deep Dive follows a structured five-step process that identifies and eliminates unnecessary variation***
- ***Deep Dive teams develop bottoms-up enhanced TOC models to make Shelf recommendations***
- ***A Virtual Shelf serves as a central repository of recommendations for new acquisitions, modernizations and repairs***

Topics for Discussion

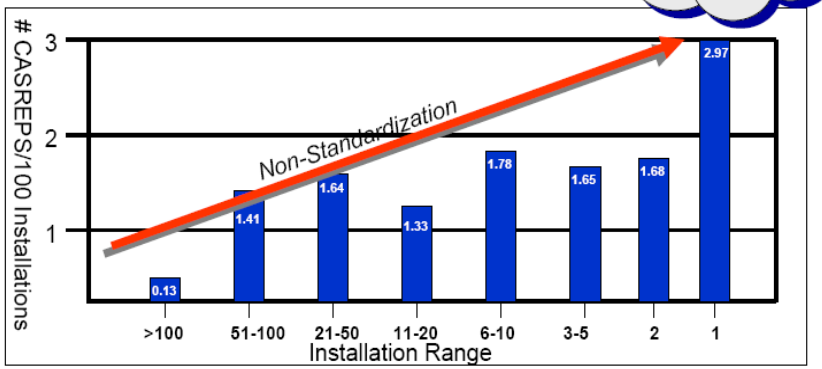
- ***Overview of NAVSEA's Commonality Program and Path Forward***
- ***Deep Dive Process***
- ***TOC in Commonality Deep Dive Process***
- ***Commonality TOC Results***
- ***Commonality Virtual Shelf and Commodity Contracts***

Mandate for Commonality

Impact of Low Density HM&E

- Proliferation of non-standard HM&E
  - *Drives higher life cycle logistics support costs*
  - *Negatively impacts readiness*

Approximately 51% or 65K Equipment Have 5 or fewer Fleet installs



Costs ▲ Readiness ▼

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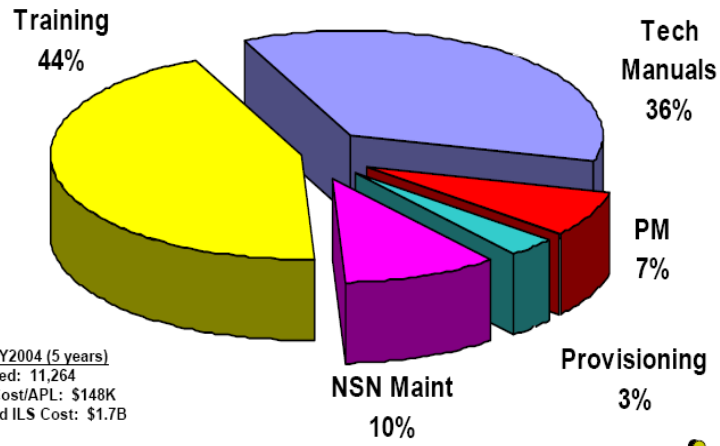
- **Non Standard HM&E Hardware**

- **Drives increased ILS Support Costs**

Average ILS Cost per HM&E APL Introduction



FY2000 thru FY2004 (5 years)
APLs developed: 11,264
Average ILS Cost/APL: $148K
Total Projected ILS Cost: $1.7B

Drives additional inefficiencies across Maritime sustainment processes

5

Unique HM&E Varieties in the Fleet

- Masts & Kingposts - 47
- Diesel Engine - 187
- Gas Turbine Engine - 30
- Reduction Gear - 641
- Clutches & Couplings – 1,113
- Shaftings - 141
- Bearings - 383
- Propulsors - 125
- Rudder - 34
- Motors – 7,125
- Ship Service Generators - 57
- Emergency Generators - 53
- Frequency Converters - 52
- Pumps – 4,171
- Valves – 37,709
- A/C units - 123
- Distilling Plants - 82
- Air Compressors - 203

Need a New Valve Today?

More Commonality Will Reduce Total Ownership

Commonality reduces variation to drive measurable benefits while maintaining or improving product performance

Definition of Commonality

What Commonality is	What Commonality is NOT
• A reduction of many parts/systems to fewer • A critical examination of necessary variation • An effort applied at the logical level of design • An effort in part designed to reduce program risk • A validated approach justified with a business case	• Is not intended to eliminate all variation (e.g. not necessarily reduce to one option, not single source) • Does not sacrifice required performance, safety or required quality • Does not necessarily apply to all levels of design – instead effort will be applied where it makes the most sense • Is not intended to in any way impede technology • Does not impact every system or where there is no justification

Commonality is an approach to engineering that accounts for program lifecycle

To date, Deep Dives have addressed 15 component types across 5 systems

NAVSEA Commonality Pilots Results Summary

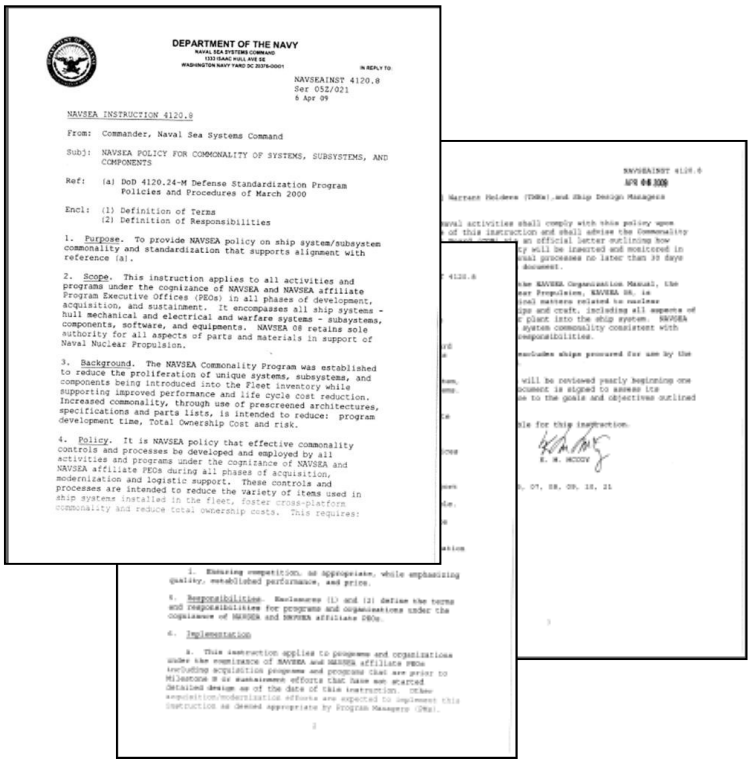
System	Sub-Systems in Scope	Variant Reduction Opportunity			Projected TOC Benefits[3]	
		Current # of Variants	# of Recommended Variants	% Reduction in Variants	TOC Benefits ($M)	% TOC Benefits (% of Spend)
Machinery Control Systems[1]	• Workstations • PLC Cards • VME Cards • UPS Units	• 24 • 63 • 58 • 18	• 8 • 31 • 14 • 5	• 67% • 51% • 76% • 72%	$59 M - $80 M *(over 7 years)*	**22% - 30%**
Fluid Systems[1]	• Centrifugal Pumps – Seawater and Freshwater	• 240	• 116	• 52%	$105 M *(over 20 years)*	**11%**
Interior Communications (Voice Systems) [1]	• PBXs • ICTs • CAAS • Telephone Terminals	• 45 • 3 • 7 • 6	• 4 • 2 • 1 • 1	• 91% • 33% • 86% • 83%	$272 M *(over 20 years)*	**14%**
Compressed Air Systems[2]	• Air Compressors • Reducing Manifolds	• 37 • 291	• 7 • 112	• 81% • 62%	$130 M *(over 25 years)*	**23%**
Lighting and Generator Controls Systems	• Lighting Fixtures • Voltage Regulators • Governor Controls	• 117 • 39 • 10	• 57 • 2 • 1	• 49% • 95% • 90%	$166 M *(over 25 years)*	**11%**
				Total Lifecycle Benefits Opportunity	**$732 M - $752 M**	**14%**

Notes: (1) Subs not included in scope of analysis, due to limited availability of data, confidential specifications, or application constraints
(2) Includes Surface Ships, Subs and Carriers
(3) Benefits include savings from acquisition price and lifecycle costs (NRE, installation, maintenance, repair, operations, training, obsolescence, etc.)

Source: NAVSEA Commonality Deep Dives

The NAVSEA commonality instruction was signed 6 April 2009

NAVSEA Commonality Instruction Contents



DEPARTMENT OF THE NAVY

NAVSEAINST 4120.8
Ser 05Z/021
6 Apr 09

NAVSEA INSTRUCTION 4120.8

From: Commander, Naval Sea Systems Command

Subj: NAVSEA POLICY FOR COMMONALITY OF SYSTEMS, SUBSYSTEMS, AND COMPONENTS

Ref: (a) DoD 4120.24-M Defense Standardization Program Policies and Procedures of March 2000

Encl: (1) Definition of Terms
(2) Definition of Responsibilities

1. Purpose. To provide NAVSEA policy on ship system/subsystem commonality and standardization that supports alignment with reference (a).

2. Scope. This instruction applies to all activities and programs under the cognizance of NAVSEA and NAVSEA affiliate Program Executive Offices (PEOs) in all phases of development, acquisition, and sustainment. It encompasses all ship systems - hull mechanical and electrical and warfare systems - subsystems, components, software, and equipments. NAVSEA 08 retains sole authority for all aspects of parts and materials in support of Naval Nuclear Propulsion.

3. Background. The NAVSEA Commonality Program was established to reduce the proliferation of unique systems, subsystems, and components being introduced into the Fleet inventory while supporting improved performance and life cycle cost reduction. Increased commonality, through use of prescreened architectures, specifications and parts lists, is intended to reduce: program development time, Total Ownership Cost and risk.

4. Policy. It is NAVSEA policy that effective commonality controls and processes be developed and employed by all activities and programs under the cognizance of NAVSEA and NAVSEA affiliate PEOs during all phases of acquisition, modernization and logistic support. These controls and processes are intended to reduce the variety of items used in ship systems installed in the fleet, foster cross-platform commonality and reduce total ownership costs. This requires:

- **Policy**
  - Establish a “Shelf” repository
  - Minimize variation in requirements and designs
  - Monitor programs and contracts for compliance, allowing competition
- **Responsibilities**
  - TWHs: act as coordinators of Shelf contents
  - NAVSEA04: support TWH in managing Shelf
  - SDMs: incorporate Shelf items into technical data package where feasible
  - PMs: support use of Shelf in acquisition and sustainment processes
  - COB: ensure Shelf processes/procedures are implemented
- **Procedures**
  - Explains Shelf procedures for

Working across the Navy, the team developed processes and policies that impact acquisition and modernization programs

Commonality Team and Program Design

Organization	Team Member
NAVSEA 00	
NAVSEA 02	
NAVSEA 04	
NAVSEA 05	
NAVSEA 08	
PEO Ships	
PEO Carriers	
PEO Subs	
PEO IWS	
PEO LMW	
NAVSUP	
Warfare Cntr.	

Acquisition Process

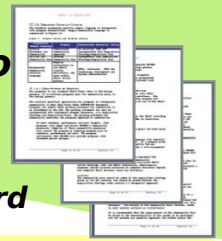
Commonality processes developed to impact acquisitions and modernizations

Tools and Database to Share Common designs – Virtual Shelf

Provide tools and processes to encourage commonality

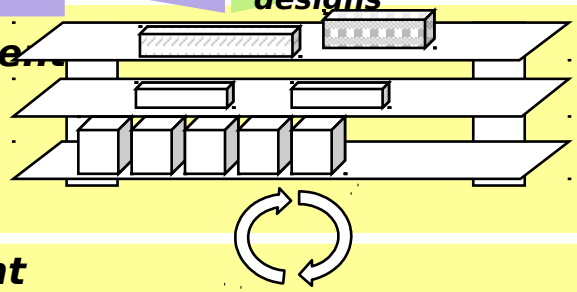
Contract Language Developed fo Industry to Implement

Controls shipyard designs



Virtual Shelf Conte...

- ***Architectures***
- ***Parts Lists***
- ***Design Guidelines***

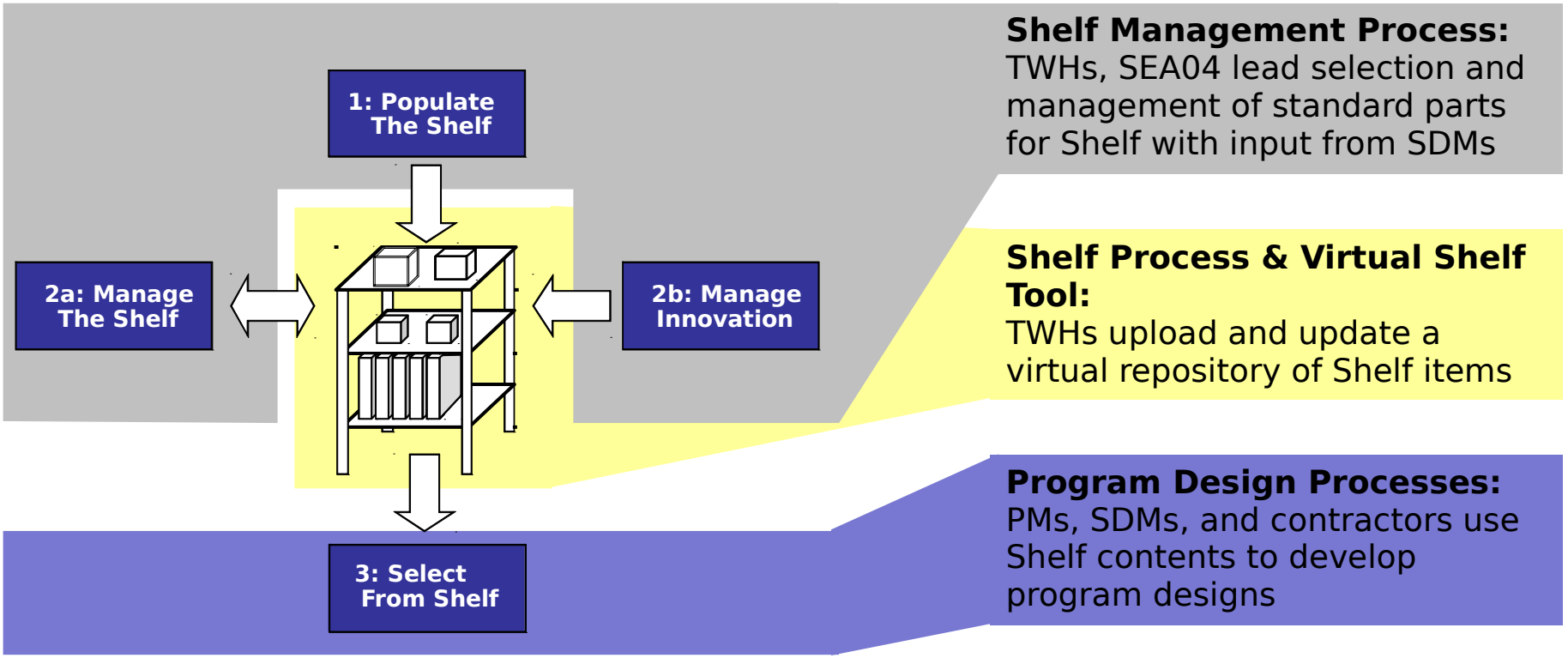


Shelf Management Process

- ***...ate Shelf***
- ***Manage the Shelf and Innovation***

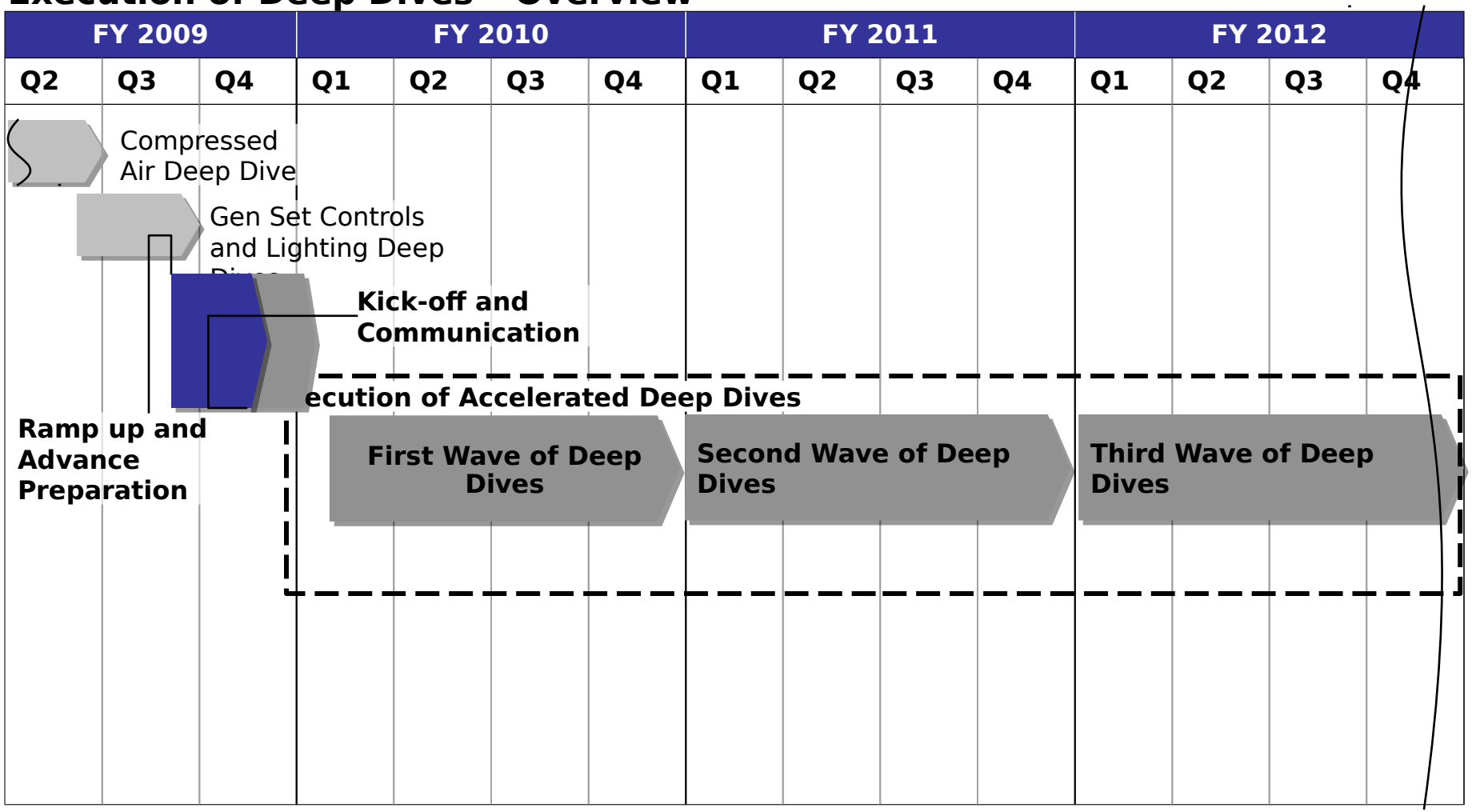
The NAVSEA Commonality program is based on the concept of a “Shelf” of standard engineering designs for program use

Shelf Commonality Concept Overview



NAVSEA plans to accelerate to 12 Deep Dives per year in order to address most ship systems in three years

Execution of Deep Dives – Overview



A Deep Dive project follows a rigorous five-step approach to identify commonality opportunities within a given system based on TOC

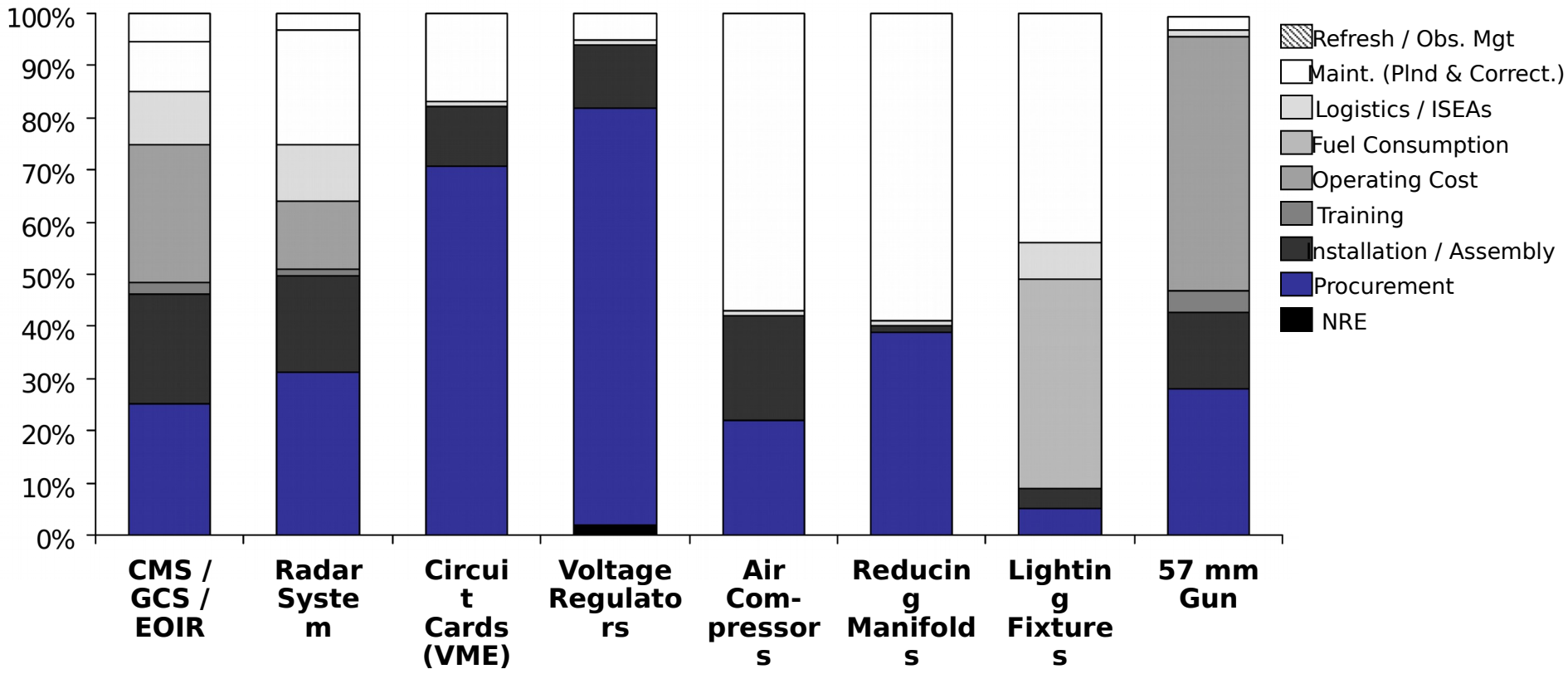
Approach Summary – Commonality Deep Dive

Questions	Detailed Questions
Where Should We focus?	▪ What sub-systems or components … ▪ … have the highest **costs**? ▪ … have the highest **existing proliferation**? ▪ … *could* be standardized and **not increase risk**?
How Many Do We Have?	▪ How many **different types** exist? ▪ How many of the **different variations** are installed across the fleet?
How Many Do We Need?	▪ How many serve the **same fit, form, function**? ▪ What attributes **create unnecessary variation** for a component?
Which are Best? Why?	▪ What common specifications will **satisfy all necessary requirements**? ▪ What are the **most important requirements**?
What Is It worth?	▪ What is the **value of the benefits** that normalized components will drive? ▪ How can we **capture identified value** in implementing commonality?

Our comprehensive bottoms-up TOC models have allowed effective trade-off evaluations and provided insight into cost drivers

Select Navy Equipment TOC Examples from A.T. Kearney Experience

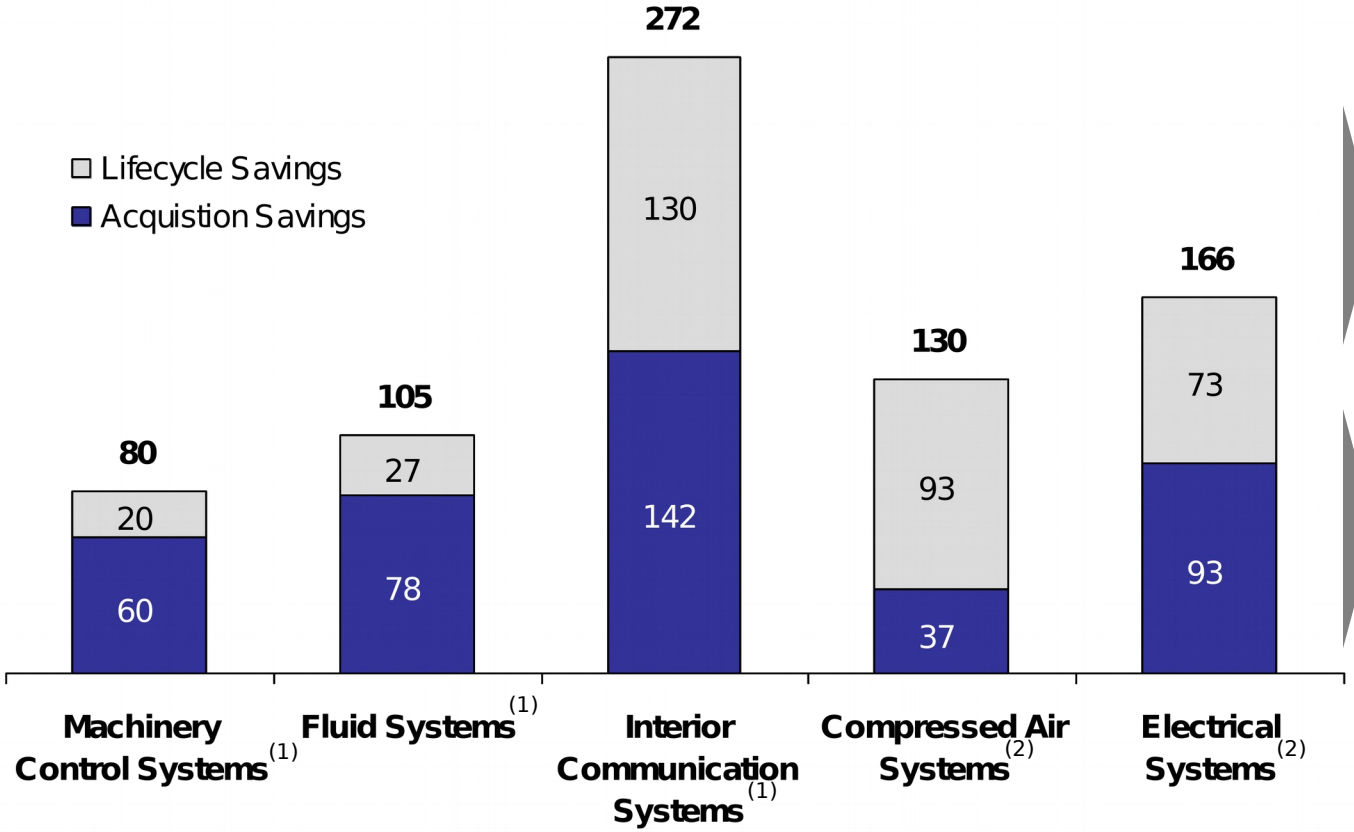
Examples



Source: A.T. Kearney Analysis from NAVSEA Commonality Deep Dives and PEO IWS LCS Common Combat System Study

In driving TOC savings, Deep Dives identify *both* acquisition and lifecycle cost savings through Commonality

Estimated Acquisition and Lifecycle Savings Over Installed Life of Equipment ($ M)(3)



Lifecycle Savings Drivers

- Reduced maintenance and repair
- Reduced ILS (training, tech. manuals, provisioning)
- Reduced obsolescence

Acquisition Savings Drivers

- Reduced NRE
- Reduced acquisition cost (purchase price)
- Reduced installation

Notes: (1) Subs not included in scope of analysis, due to limited availability of data, confidential specifications, or application constraints
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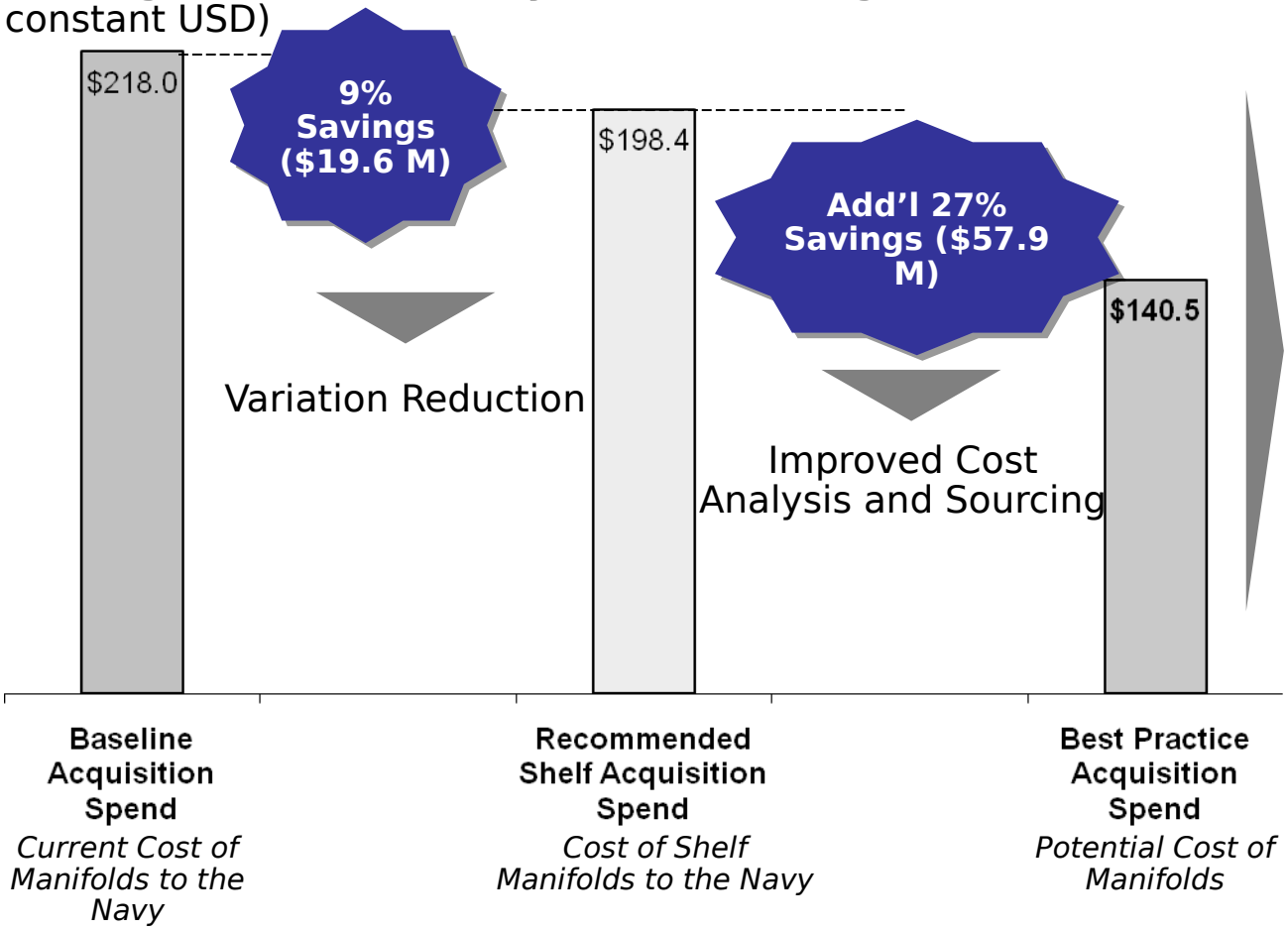
Source: NAVSEA Commonality Deep Dives

Savings beyond existing commonality savings are possible through improved sourcing

Reducing Manifolds Potential Acquisition Savings – Commonality and Sourcing ($ M, 2009 constant USD)



- Commercially-accepted cost driver analysis piloted
- "Should" Cost vice Actual Cost
  - Air reducing manifolds
  - Similar analysis used for F-22, F35 Aircraft Programs
- **Analysis provides a fact-based understanding of cost drivers allowing the Navy to negotiate for the "best" price**

Note: (1) Estimate based on best practice manifold acquisition spend - determined from linear price performance (multivariable regression) and historical NAVSEA spend

TWHs will populate the Shelf with the information SDMs and contractors would need to use prescreened Shelf equipment

Type of Information on Shelf
For each Shelf sub-system / component, the Shelf contains…
▪**Engineering descriptions of shelf items** – to enable integration of shelf items into standard architectures
▪**Specifications for shelf items** – to facilitate procurement of shelf items
▪**Design Handbooks –** for integrating shelf components using standard architectures
▪**Design Standards –** describing requirements for integrated shelf systems
▪**Total Ownership Cost Data and Business Case Analysis templates –** to support developing the Business Case Analysis for deviations
▪**A Shelf Roadmap –** indicating the expected lifespan of each element on the shelf

TWHs must be come more proactive in applying the shelf. Metrics we will use are new APL's generated in their area of responsibility

As the Shelf develops, commodity contracts the team will develop commodity contracts for select sub-systems and components

Linking Commonality to Commodity Contracts